DOCUMENT RESUME

ED 252 323 PS 014 870

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TITLE Acquisition of Piagetian Concepts among Micronesian Children.
PUB DATE [82]
NOTE 9p.; Paper presented at the International Congress on Mathematics Education V (Adelaide, Australia).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Age Differences; *Children; *Cognitive Development; *Conservation (Concept)
IDENTIFIERS *Centration; *Concept Acquisition; Micronesia; Pacific Trust Territory; Piagetian Reversibility; Piagetian Tasks; Piagetian Theory

ABSTRACT

Micronesian children residing on Truk and Kosrae were examined for performance on eight conservation tasks and on one task each of centration and reversibility (generally precursors of conservation in Piaget's theory of cognitive development). A total of 75 children were tested--33 in the village of Moen, Truk, and 42 in all the villages of Kosrae. Subjects ranged in age from 5 to 13 years; 45 were male and 30 were female. Each child was tested on performance during a single individually administered session. With the exception of two older Trukese children, who spoke English well, all were interviewed in their native language. Preliminary results indicated that Micronesian children lag significantly behind their Western counterparts in acquisition of certain concepts hypothesized by Piaget as critical to concrete operational thought; they also do not appear to acquire these concepts in the same order as American and European children. Though most younger Micronesian children cannot understand or read English, the subjects tested were attending schools patterned after those in the United States, had teachers educated by United States standards, and even used United States textbooks. The fact that the children's development of certain key concepts is several years behind United States norms was seen as possibly being the result of culture, as several researchers have suggested. It was also suggested that presenting Western educational materials to Micronesian children may be inappropriate. (RH)

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ACQUISITION OF PIAGETIAN CONCEPTS AMONG MICRONESIAN CHILDREN

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The claim of Jean Piaget that children acquire certain concepts of cognitive development at particular ages and in an invariant order was investigated using 75 Trukese and Kosraen children ages 5-13. Ten tasks of conservation, centration and reversibility were examined. Results indicate that the Micronesian children lag considerably behind their American and European counterparts in regard to the age at which these concepts are acquired, and the order of acquisition is different from that advanced by Piaget.

The theories of Jean Piaget, founder of the Genevan school of human cognitive development, have been the subject of numerous cross-cultural studies. Though often different in procedure and content, the underlying purpose of the research is to examine the validity of Piaget's view of universalities in acquisition of developmental concepts, that is, how human children learn to think, and the order of their acquisition.

The study reported here is a preliminary investigation of Micronesian children in the islands of Truk and Kosrae, part of the U.S. administered Trust Territory of the Pacific Islands. The children were examined for performance on eight conservation tasks and on one task each of centration and reversibility, generally precursors of conservation in Piaget's theory of cognitive development. Conservation is a major cornerstone in Piaget's stage of concrete operations; he considers it "a necessary condition for all rational activity.(Piaget 1952:3)."

The purpose of the study is to determine whether Trukese and Kosraen children acquire the concepts tested at the same age and in the same order as do their American and European counterparts, or whether they deviate from Western norms as has been noted in several cross-cultural studies. Deer and Kelly (1982) found that East Javanese children conserved quantity, number, length as opposed to the European order of number, quantity, length. DeLemos (1969) reported that Australian Aborigine children conserved weight before quantity and conserved area considerably after quantity and length, all in contradiction to Piaget's findings. In a study involving conservation of distance, area and displacement volume among Nigerian children,

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Ehindero (1982:4) found "no clear and uniform developmental progression on task performance with increasing chronology was observed." Several studies have attested to slower development of conservation concepts in non-Western cultures (DeLemos 1969; Za'rour 1971; Fahrmeir 1978).

Further studies of Micronesian children in other islands is planned. As far as is known to the author, this is the first study of Micronesian children ever done on the basis of Piaget's theories.

Method

Subjects

A total of 75 children were tested--33 in Moen, Truk and 42 in all the villages of Kosrae. They ranged in age from 5 to 13 years; exact birthdates of all were obtained. There were 45 males and 30 females. All children of school age had attended school.

Procedures

Each child was tested in a single, individually-administered session. With the exception of two older Trukese children who spoke English well, all were interviewed in their native language by examiners trained by the author. The author was present at the interviews, but largely in the background. The order of tasks was varied and not all subjects were tested on each concept. The tests were as follows.

Centration. The subject (S) was shown two rows of square blocks, one with nine blocks close together and the other with seven blocks spread out so that this row was longer than the other. S was asked which row contained the most blocks.

Reversibility. S was shown two equal-length rows of eight blocks each. After agreement that they contained the same number of objects, one of the rows was lengthened and S was asked which of the rows had the most blocks.

Conservation.

a. Conservation of number. S was shown a row of five blocks, somewhat spread out, and asked to construct a row with the same number of blocks.

b. Conservation of number. S was presented with a tall, thin graduated cylinder and a short, stout plastic cup and directed to place one bean in the cylinder, one in the cup, and so on until there were nine beans in each. S was then asked which container held the most beans.

c. Conservation of length. S was shown two sticks of equal length, parallel to each other. After agreement that they were the same length, one was moved slightly to the right and S was asked if they were still the same length or if one was longer than the other.

d. Conservation of area. S was shown two equal-size pieces of green construction paper, each containing an identical toy dog. The examiner explained that the green was a field of grass where the dog could play; S agreed that the dogs had equal play area. Then a wooden block was placed on each field and S was told that this was a house that had been constructed on the field. S again agreed that the dogs had the same amount of play area. A second house was placed in each field, one adjacent to the existing house, the other in a different corner, and S was asked if the dogs still had equal play area. If the question was answered correctly, a third house was placed in each, in one case adjacent to the other two and in the second case, in a different corner. S was asked which dog had the most play area or if they still had the same.

e. Conservation of quantity (Solid). S was given two balls of modeling clay and allowed to adjust clay from one to the other until he/she agreed they contained the same amount of clay. S was directed to flatten one ball and then was asked if they still had the same amount of clay.

f. Conservation of weight. This task proceeded as in e above except S weighed the balls on a balance scale and adjusted clay until the weights were equal. After removal from the scale and flattening of one, S was asked if they still weighed the same or, if not, which weighed the most.

g. Conservation of quantity (Liquid). S was given two identical cups of water and asked to pour from one to the other until they contained the same amount of water. Then the contents of one cup were poured into a tall, thin graduated cylinder and S was asked if the containers held the same amount of water.

h. Conservation of volume (Displacement). S was given two identical cups of water and allowed to pour from one to the other until he/she agreed they held the same amount of water. A ball of clay was dropped into one of the containers, causing the water level to rise perceptibly. S was asked if the containers still held the same amount of water.

Results

Subjects who exhibited total lack of acquisition of the conservation concept being tested were classified as N--nonconservers and those who exhibited acquisition as C--conservers. Some initially appeared to be nonconservors on a task but changed their responses after questioning by the examiner, rephrasing of the questions, or additional experiences such as seeing the water poured back into the original container; these were classified as T--transitional. The same classifications are used for centration and reversibility in Table 1.

Centration. In the 5-6 year age group, only 4 of 15 Ss had acquired this concept, but 7 exhibited transitional responses. However, of 19 Ss 7-9 years of age, all had acquired the concept except one who was transitional.

Reversibility. Only 14 of 33 Ss ages 5-9 had acquired reversibility and even one 10-year old was still transitional.

Conservation of Number. At age 8, all but one of 28 Ss were successful on the first number task. However, even some Ss ages 9-10 were still transitional on the second number task.

Conservation of Length. The concept of conservation of length should be acquired at around age 7, according to Piaget (Piaget , Inhelder and Szeminska 1960:95-103), however, of 58 Ss tested for this concept, only 10 exhibited acquisition. Even half of the Ss in the 12-13 age group did not conserve length.

Conservation of Quantity (solid), Area, Weight. Piaget predicted that children will conserve area and quantity (solid/mass) around the ages 7-8 and weight around ages 9-10 (Wadsworth 1971:84). Of the children in this study, only 5 of 44 conserved quantity (solid/mass) and 6 of 43 conserved area, even up through age 13. Conservation of weight was somewhat easier for the Ss with 15 of 39 exhibiting aquisition.

Conservation of Quantity (Liquid) and Displacement. According to Piaget, most children will conserve volume around ages 11-12 (Wadsworth 1971:84); this was not true of the children in this study. Only 15 of 40 tested conserved volume when two perceptually different containers were used and 7 of 40 conserved when the liquid was displaced.

The results of performance on all tasks is summarized in Table 1.

Discussion

It must be emphasized that the research described in this paper is not complete. Similar tests will be conducted with children of other Micronesian islands and with Micronesian children residing in Guam. Further analyses will compare performance among various Micronesian island groups and Micronesians residing in Guam, and look at the influence of other factors such as sex and amount of schooling.

Preliminary results, presented here descriptively, indicate that Micronesian children lag significantly behind their Western counterparts in acquisition of certain concepts hypothesized by Piaget as critical to concrete operational thought. They also do not appear to acquire those concepts tested in the same order as American and European children.

These Micronesian children attend schools patterned after U.S. school systems, have teachers educated by U.S. standards, and even use U.S. textbooks, though most younger children cannot understand or read the English in those texts. If their development of certain key concepts is several years behind U.S. norms, then perhaps the retardation is an effect of the culture, as suggested by Deer and Kelly (1982:225-226), DeLemos (1969: 265-267) and Okonji (1971:127-128). This also raises a question if Micronesian school systems may be presenting inappropriate Western-based material to their children. Further research is planned in Micronesia to determine if this is the case.

Summary of Test Results
Table 1

Age	Sex		Centration		Reversibility		Cons. No. #1		Cons. No. #2		Cons. Length	
			Truk	Kosrae	Truk	Kosrae	Truk	Kosrae	Truk	Kosrae	Truk	Kosrae
5	M	N	1	1	2	2	1	1				
		T	1	2					1			
		C	1		1		2	1		1		
	F	N		1		1				1		1
		T	1									
		C			1		1	1			1	
6	M	N						1	1	1	1	1
		T		1		1						
		C	2		1		2		1		1	
	F	N		1		2		1		1	2	2
		T		2				2		1		1
		C	1		1	1	1		1			
7	M	N						2			1	2
		T				1		1		3		
		C	1	4	1	3	1	2	1	1		
	F	N			1			1	2		3	4
		T		1		3		2		1		
		C	2	2	1		1		1	1		
8	M	N				2		1			1	
		T										
		C		3		1	1	1	1			
	F	N									1	
		T										
		C	1		1		1		1			
9	M	N									2	1
		T				3						
		C		1	1	1	1	1	2			
	F	N									1	4
		T								4		
		C		4				1	1			
10	M	N									2	3
		T			1							
		C							1	1	1	
	F	N									1	2
		T								1		
		C			1					1		
11	M	N									1	1
		T										
		C			1							2
	F	N									2	
		T										
		C								1		1
12	M	N								2	1	2
		T										
		C							1	3		3
	F	N										
		T										
		C								1		1
13	M	N								2		2
		T										
		C										
	F	N								1		1
		T										
		C										

N=Nonconserver, T=Transitional, C=Conserver
Numbers in cells are numbers of children.

Summary of Test Results
Table 1 Continued

Age	Sex		Cons. Area		Cons. Quantity		Cons. Wgt.		Cons. Liquid		Cons. Displ.	
			Truk	Kosrae	Truk	Kosrae	Truk	Kosrae	Truk	Kosrae	Truk	Kosrae
5	M	N	2									
		T										
		C										
	F	N										
		T										
		C										
6	M	N	1						1			
		T										
		C	1								1	
	F	N				1						
		T						1				
		C										
7	M	N	1	1		2				2		
		T										1
		C		1		1				1		
	F	N	1		1	2	1		1			
		T										
		C	1									
8	M	N	1	2	1	3			1	1		
		T					1					
		C										
	F	N	1						1			
		T										
		C	1				1				1	
9	M	N	2	1	2	1	1		1		1	
		T										
		C			1		2		2		1	
	F	N	1	1	1	3	1		1			
		T										
		C										
10	M	N	2	3	3	3		1	3	2	2	1
		T					1	1				
		C					2			1		
	F	N	1	2	1	2	1	2	1	1		
		T										
		C										
11	M	N		3	1	1	1	1	1	1	1	2
		T					1	1				
		C	1			2	1	1	2	2	1	1
	F	N	1	1	2	1	1	1	1		1	1
		T					1					
		C	1						2	1	1	
12	M	N	1	5		5		3	1	2	2	2
		T					1					
		C					1	2	1	3		1
	F	N		1		1		1		1		
		T					1					
		C					1		2			
13	M	N		2		2				1		1
		T								1		
		C						2				
	F	N		1		1				1		
		T										
		C						1				

N=Nonconserver, T=Transitional, C=Conserver
Numbers in cells are numbers of children.

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